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A STUDY OF SOME CHARACTERISTICS OF VEGETABLE OILS

BY

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ASSISTANT CURATOR OF ECONOMIC BOTANY

B. E. DAHLGREN

ACTING CURATOR, DEPARTMENT OF BOTANY

EDITOR



CHICAGO, U. S. A.

JUNE 19, 1930

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A STUDY OF SOME CHARACTERISTICS OF VEGETABLE OILS

JAMES B. MCNAIR

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A number of years ago it occurred to the writer that there might be a relationship between the melting point of an oil of a plant and the temperature of its environment. The idea was suggested by the fact that in general the melting points of marine animal oils are lower than the melting points of the oils of land animals. In accordance with this idea tropical plants should have oils of higher melting points than those of plants of temperate climates; seeds may have oils of lower melting points than those contained in seed coverings; plants of tropical origin may retain their high melting-point oils in temperate climates; and oil properties may be of value in species identification.

In the tissues of most plants there are small particles of oil that may serve as reserve food for the plant or its seedlings. The most common storage place for oil is the seed, where oil is almost always present in at least a small amount, and in some cases it may be the dominant form of stored food. Oil is, however, not confined to seeds, but occurs also in the flesh of fruits (olives, oil palm fruits), in rootstocks and tubers (potato, iris, and sedges), and in bulbs (onion).

DATA AND DEFINITIONS USED

Data of approximately 318 oils, fats, and waxes have been assembled and reclassified for this article from Volume II of the sixth edition of Julius Lewkowitsch's *Chemical Technology and Analysis of Oils, Fats and Waxes*, published in 1922.

In the present article oils are classified in four groups: drying, semi-drying, non-drying, and fats. In order that the classification used may be better understood these four groups are defined as follows:

Drying oils are so called because they absorb oxygen from the air and dry to an elastic skin when exposed to the air in a thin layer. Linseed oil is a good example. The drying power is directly proportional to the size of the iodine value; consequently the best drying oils are those which absorb the greatest amount of iodine. The drying oils likewise have the lowest melting points of the oils here considered. Chemically they are glycerides of fatty acids

belonging to the linolenic and linolic groups, oleic acid forming only a small proportion of the liquid fatty acids.

Semi-drying oils have melting points and iodine values that lie between those of the drying oils and the non-drying oils. They differ chemically from drying oils by an almost complete absence of linolenic acid, while they are differentiated from non-drying oils by a larger content of linolic acid. The proportion of linolic acid decreases as the iodine value decreases. Cotton seed, maize, and sesame oils are examples of this group.

Non-drying oils have higher melting points and lower iodine values than those exhibited by the members of the drying and semi-drying oils. Linolenic acid is completely absent and linolic acid is present in small quantities only. Olive and castor oils are examples of this group.

Vegetable fats are oils that are solid in temperate climates. They present, however, a variety of gradations from the soft, buttery mass of laurel oil to the hard, waxlike Japan tallow. As the hardness of the fats increases approximately in direct proportion to the decrease of the content of glycerides of oleic and linolic acids, the iodine value would most appropriately determine, in the absence of other more striking chemical characteristics, the order in which the individual fats may be enumerated. Examples of fats are cacao butter, coconut oil, Japan wax, and myrtle wax.

Vegetable waxes as a group have higher melting points and lower iodine numbers than any of the oils here considered. They are not glycerides, but are chemical mixtures of fatty esters of higher monohydric aliphatic and phytosterol alcohols. Waxes are distinguished from fats by the fact that waxes are esters of monohydric alcohols while fats are esters of the trihydric alcohol, i.e., glycerol. Carnauba and palm waxes are examples.

Some 318 oils have been studied. Of these 318 oils, 62 are drying oils of low melting point, 83 are semi-drying oils of higher melting point, 71 are non-drying oils of still higher melting point, and 102 are fats.

OILS IN SEED KERNELS AND SEED COVERINGS

Oils are chiefly found accumulated in seeds. In fact, practically all the oils considered in this article come from this source. However, it may be well at this point to discuss the properties of the oils from seed kernels in contrast to the oils from seed coverings.

If it is true that the environment in which an oil is produced should influence its melting point, i.e., that oils produced in tropical plants should have higher melting points than those produced in cold climates, then it might be expected that oils found in seed coverings should have higher melting points than oils found in seed kernels of the same plant. It is understood that the diurnal fluctuations in air temperature to which the seed covering is subjected cause the daily maximum temperature of the seed covering to be greater than the daily maximum temperature of the seed kernel. In the tropics, where the minimum temperature is higher and the diurnal and seasonal fluctuations in temperature are less than in the temperate zone, the melting points of the seed covering

PHYSICAL AND CHEMICAL PROPERTIES OF OILS FROM KERNELS
AND SEED COVERINGS

Family	Plant	Oil Source	Sp. Gr. (15° C.)	Sapon. Value	Iodine Value	Class
Euphorbiaceae	<i>Sapium sebiferum</i>	covering, kernel	.915-.918 .9458	179.0-205.7 203.8-210.4	19.0 - 37.7 145.6-160.7	fat drying
Anacardiaceae	<i>Rhus laurina</i>	covering	.9011	157.1	11.44	fat
	<i>Rhus succedanea</i>	covering	.975	217.5-237.5	4.2 - 15.1	fat
	<i>Rhus diversiloba</i>	covering	.9896	220.6	8.79	fat
	<i>Rhus glabra</i>	kernel	.9257-.9259	190.8-193.8	126.9	semi-drying
Oleaceae	<i>Olea europaea</i>	covering, kernel	.916-.9196 .9184-.9191	188.7-203.0 182.3-183.8	77.28- 91.7 86.99- 87.8	non-drying
Palmae	<i>Elaeis guineensis</i>	covering, kernel	.9209-.9245 .9119	196.3-205.5 246.3-250.0	53.0 - 57.44 10.3 - 17.5	fat fat
	<i>Astrocaryum vulgare</i>	covering, kernel	.916	196.5-197.2 242.5-243.3	74.8 - 75.7 10.4 - 11.2	fat fat

and seed kernel oils would be more nearly equal, as well as higher than the melting points of the temperate oils. This may be influenced by the size and structure of the fruit. In agreement with this theory the oils from the seed coverings of the Chinese tallow tree (*Sapium sebiferum* Roxb.) and various species of sumac (*Rhus*) have higher melting points than their corresponding seed kernel oils. However, in the cases of the African oil palm (*Elaeis guineensis* Jacq.) and the Tucum palm (*Astrocaryum vulgare* Martens) the kernel oils have higher melting points than oils of the seed coverings;

but it should be noted that all of these oils are from tropical plants and that the kernel oils have higher melting points than the kernel oils of temperate plants. In the case of the olive, another tropical plant, both oils are similar.

WAXES ON STEMS AND LEAVES

Vegetable waxes are for the most part exudations of plant leaves and stems, and mostly occur in small quantities. Of a total of twenty waxes considered four are found on plants growing in temperate climates and twelve are from tropical or sub-tropical plants.

These waxes occur in the Gramineae, Palmae, Moraceae, Papaveraceae, Saxifragaceae, Linaceae, Euphorbiaceae, Malvaceae, Bombacaceae, Asclepiadaceae, and Compositae.

OILS IN RELATION TO SPECIES

Iodine numbers, saponification values, and specific gravities of the various oils may shed some light on specificity.

The attached tables may be of value in qualitative analysis and an aid to the determination of any oil on the list. For instance, we may have an oil of unknown origin with a saponification number of 114.5, an iodine number of 132.6–157.5, and a specific gravity number of .924–.927 at 15°C. Referring to the list of iodine numbers we find that it may be the oil of *Couepia grandifolia*, *Lepidium sativum*, *Manihot Glaziovii*, *Hevea brasiliensis*, *Helianthus annuus*, *Glycine hispida*, *Guizotia abyssinica*, *Aleurites ricinodendron*, *Amoora Rohituka*, *Juglans regia*, *Papaver somniferum*, or any of some forty-nine other plants. However, when we note the determined saponification number of 114.5 we find the number of plants that will correspond is restricted to *Linum usitatissimum* and *Papaver somniferum*. As *Linum usitatissimum* does not have an iodine value within the specified range, the oil must be of *Papaver somniferum*, provided, of course, the source plant is among those listed.

OILS IN RELATION TO GENERA

There is close agreement between the oils of the different species of a genus. For instance, in the genus *Trifolium*:

Trifolium agrarium: sp. gr. at 15°C., 0.9290; N_d 30°C., 1.4757; sap. v. 188.4; iod. v. 75.9; solid. pt. —15°C. *Trifolium hybridum*: sp. gr. at 15°C., 0.9250; N_d 30°C., 1.4757; sap. v. 187.2; iod. v. 65.9; solid. pt. —14°C. *Trifolium incarnatum*: sp. gr. at 15°C., 0.9170; N_d 30°C., 1.4723; sap. v. 181.3; iod. v. 61.6; solid. pt. —9°C. *Tri-*

folium repens: sp. gr. at 15°C., 0.9170; N_D 30°C., 1.4745; sap. v. 189.4; iod. v. 68.5; solid. pt. —16°C.

OILS IN RELATION TO FAMILIES

Oils are found in at least 83 (30 per cent) of the plant families out of the 277 families listed by Engler and Prantl.

Within the smaller families the oils of the respective genera and their species are in close agreement as in the Cruciferae, Cucurbitaceae, Lauraceae, Myristicaceae, Pinaceae, Polygalaceae, Rutaceae, Sapindaceae, Sapotaceae, Simarubaceae, Solanaceae, and the Umbelliferae.

In the large families the oils of the different genera are usually in close agreement when grouped according to tribes. For instance:

Leguminosae

Subfamily I. Mimosoideae: (F)¹ Parkia, (ND) Pentaclethra

Subfamily II. Caesalpinioidae: (SD) Caesalpinia

Subfamily III. Papilionatae:

Tribe 3. Genisteae: (SD) Cytisus, (SD) Spartium, (ND) Lupinus

Tribe 4. Trifolieae: (ND) Trigonella, (ND) Trifolium, (ND) Ornithopus, (ND) Melilotus, (ND) Medicago

Tribe 5. Loteae: (ND) Lotus, (ND) Anthyllis

Tribe 6. Galegeae: (ND) Galega, (D) Robinia, (D) Caragana, (D) Amorpha

Tribe 7. Hedysareae: (ND) Arachis, (ND) Onobrychis

Tribe 8. Viciae: (SD) Vicia, (SD) Cicer, (SD) Pisum, (SD) Lens

Tribe 9. Phaseoleae: (SD) Voandezia, (SD) Cajanus, (SD) Dolichos, (SD) Canavalia, (SD) Mucuna urens, (SD) Vigna, (SD) Phaseolus Mungo, (SD) Phaseolus lunatus, (SD) Phaseolus inamoenus, (SD) Phaseolus coccineus, (SD) Phaseolus vulgaris, (D) Glycine

Tribe 10. Dalbergiae: (F) Dipteryx, (F) Pongamia

Gramineae

Tribe 1. Paniceae: (D) Panicum

Tribe 2. Maydeae: (SD) Zea

Tribe 3. Oryzeae: (ND) Oryza

Tribe 6. Andropogoneae: (SD) Sorghum

Tribe 7. Phalarideae: (SD) Phalaris

Tribe 12. Hordeae: (SD) Secale, (SD) Triticum, (SD) Hordeum

Cucurbitaceae

Tribe 1. Cumerineae: (F) Hodgsonia, (ND) Telfairia, (F) Luffa, (SD) Acanthosicyus, (SD) Cucumis, (SD) Citrullus, (SD) Cucurbita, (SD) Bryonia

Tribe 3. Elateriae: (SD) Echinocystis

Guttiferae

Tribe 2. Moronobeae: (F) Symphonia, (F) Pentadesma

Tribe 3. Garcinieae: (F) Garcinia

Tribe 4. Calophylleae: (ND) Calophyllum, (ND) Mesua

¹The abbreviation D = drying oil, SD = semi-drying oil, ND = non-drying oil, and F = fat.

OILS OF TROPICAL AND SUBTROPICAL PLANTS

Of the 83 plant families known to contain oils, 40, or 48.1 per cent, are mainly tropical or subtropical in habitat. According to these statistics, therefore, oils are more frequently found in tropical and subtropical than in plants of temperate regions.

Of the 62 drying oils, 25, or 40 per cent, are from tropical and subtropical plants. Drying oils are therefore not as frequently met with in tropical plants as in plants grown elsewhere.

Of the 83 semi-drying oils, 41, or 49 per cent, are from tropical plants.

Of the 71 non-drying oils, 42, or 59 per cent, are from tropical plants.

Of the 102 fats, 101, or 99.97 per cent, are from tropical plants.

From these data it may be concluded that tropical and subtropical plants are more likely to have fats (highest melting-point oils) than non-drying, semi-drying, or drying oils (lower melting-point oils).

The percentages of drying oils, semi-drying oils, non-drying oils, and fats increase among tropical plants as follows: drying 7.86 per cent, semi-drying 12.89 per cent, non-drying 13.2 per cent, and fats 31.76 per cent.

CHARACTER OF OILS IN RELATION TO CLIMATE OF HABITAT

HABITAT	DRYING OILS		SEMI-DRYING OILS		NON-DRYING OILS		FATS	
	No.	%	No.	%	No.	%	No.	%
Tropical	25	7.86	41	12.89	42	13.2	101	31.76
Temperate	37	11.63	42	13.20	29	9.12	1	00.03
Total	73	19.49	133	26.10	90	22.32	105	31.67

OILS OF NON-TROPICAL AND NON-SUBTROPICAL PLANTS

Of the 83 plant families known to contain oils, 15, or 18.0 per cent, are mainly temperate in habitat.

Of the 62 drying oils, 37, or 59 per cent, are from plants growing in temperate climates. Of the 83 semi-drying oils, 42 are from temperate plants. Of the 71 non-drying oils, 29 are from plants growing in temperate zones.

Of the 102 fats only one is from a plant growing in a temperate climate.

From these data it may be concluded that plants growing in temperate climates are more likely to have drying oils (lower melting-point oils) than semi-drying or non-drying oils and fats (higher melting-point oils).

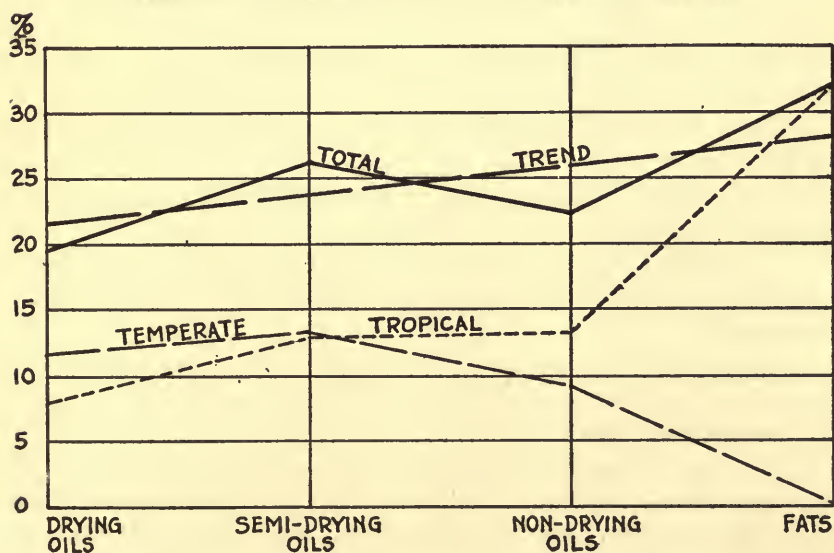
The percentages of drying, semi-drying, non-drying oils, and fats increase in plants growing in temperate habitats as follows: fats .03 per cent, non-drying oils 9.15 per cent, drying oils 11.63 per cent, and semi-drying oils 13.2 per cent.

Drying and semi-drying oils are therefore of more frequent occurrence in plants growing in temperate climates than in tropical plants.

OILS IN RELATION TO PLANT ORIGINS

As to a possible relation between the melting points of oils and tropical origin the following families with high melting-point oil are

CHARACTER OF OILS IN RELATION TO CLIMATE OF HABITAT



of interest (non-drying oils and fats): Cyperaceae, Palmae, Myristicaceae, Betulaceae, Ulmaceae, Olacaceae, Chenopodiaceae, Lardizabalaceae, Lauraceae, Moringaceae, Tropaeolaceae, Simarubaceae, Burseraceae, Meliaceae, Polygalaceae, Anacardiaceae, Hippocastanaceae, Sapindaceae, Vitaceae, Bombacaceae, Sterculiaceae, Ochnaceae, Caryocaraceae, Theaceae, Guttiferae, Dipterocarpaceae, Flacourtiaceae, Caricaceae, Rhizophoraceae, Combretaceae, Arali-

aceae, Sapotaceae, Oleaceae, Salvadoraceae, Loganiaceae, Asclepiadaceae, Verbenaceae, Bignoniaceae, Rubiaceae, Caprifoliaceae.

It is noted that the majority of these families are mainly tropical in their distribution, notable exceptions being Cyperaceae, Betulaceae, and Chenopodiaceae.

SUMMARY

There may be a relationship between the melting point of a fat or oil of a plant and the temperature of its environment. Such a relationship is known to exist in the case of oils of marine and terrestrial animals.

Oils are found in at least 83 (30 per cent) plant families out of 277 listed by Engler and Prantl.

Some 318 oils have been studied from these 83 families: 62 are drying, 83 are semi-drying, 71 are non-drying, and 102 are fats.

Oils found in seed coverings may have higher melting points than oils of seed kernels.

Waxes are found more abundantly on tropical plants than on plants of temperate climates.

There is close agreement between the oils of the different species of a genus.

The physical and chemical properties of oils may be more or less definitely correlated with specificity.

Tables of iodine numbers, saponification values, and specific gravities of over 300 oils are included. These may aid in differential analysis.

The oils of most of the smaller families are in close intrafamilial agreement, while those of the larger families are often in better agreement considered in tribal groups.

Tropical and subtropical plants are more likely to have fats and non-drying oils than semi-drying or drying oils, i.e., tropical and subtropical oils have higher melting points than the oils of temperate climates.

As to the possible relation between high melting-point oils and tropical origin a list of 40 families is given. Of this list three are mainly temperate in habitat.

SAPONIFICATION VALUES OF OILS, FATS AND WAXES

2.49	<i>Attalea funifera</i>	176.7	-186.6	<i>Ricinus communis</i>
46.76- 60.0	<i>Pedilanthus Pavonis</i>	176.8		<i>Ptychotis ajowan</i>
50.3 - 51.3	<i>Raphia Ruffa</i>	177.3		<i>Sinapis chinensis</i>
62.9 - 63.1	<i>Euphorbia antisyphlitica</i>	178.0	-183.0	<i>Hydnocarpus edulis</i>
63.0(?)	<i>Coriandrum sativum</i>	178.0	-185.1	<i>Pongamia glabra</i>
65.8	<i>Philadelphus coronarius</i>	178.0	-186.4	<i>Lepidium sativum</i>
78.4 - 88.3	<i>Corypha cerifera</i>	178.1		<i>Tilia americana</i>
101.51-162.0	<i>Linum usitatissimum</i>	178.1		<i>Apium graveolens</i>
113.0(?)	<i>Pyrus communis</i>	178.2		<i>Sinapis dissecta</i>
114.5	<i>Papaver somniferum</i>	178.22		<i>Mucuna urens</i>
140.0	<i>Euphorbia stenoclada</i>	178.3		<i>Carum Carvi</i>
142.8	<i>Euphorbia xylophylloides</i>	178.3	-178.4	<i>Pimpinella Anisum</i>
153.0 -191.0	<i>Myristica officinalis</i>	178.4	-191.4	<i>Secale cornutum</i>
156.2	<i>Picramnia carpinterae</i>	179.0	-205.7	<i>Stillingia sebifera</i>
157.0	<i>Acer platanoides</i>	179.1	-192.6	<i>Aleurites moluccana</i>
157.1	<i>Rhus laurina</i>	179.3		<i>Cuminum Cyminum</i>
159.6	<i>Vohemaria Messeri</i>	179.4		<i>Sinapis arvensis</i>
165.1 -177.5	<i>Coffea arabica</i>	179.4	-193.5	<i>Daucus Carota</i>
165.58-191.6	<i>Pistacia vera</i>	179.5		<i>Oryza sativa</i>
166.2 -170.6	<i>Strychnos nux-vomica</i>	179.5		<i>Crambe maritima</i>
167.9	<i>Saccharum officinarum</i>			<i>Palaquium sp. (Surin fat)</i>
168.5	<i>Fraxinus excelsior</i>	179.6		<i>Kickxia elastica</i>
170.0(?)	<i>Laurus indica</i>	179.7	-197.8	<i>Prunus Cerasus</i>
170.1(?)	<i>Sapindus rarak</i>	179.8		<i>Acer Pseudo-platanus</i>
170.14	<i>Ceiba pentandra</i>	179.9		<i>Eriobotrya japonica</i>
170.3 -177.8	<i>Sinapis alba</i>	180.0		<i>Barbarea praecox</i>
170.4	<i>Eruca sativa</i>	180.3(?)		<i>Cheiranthus Cheira</i>
170.8	<i>Hyoscyamus niger</i>	180.5		<i>Vicia sativa</i>
170.9	<i>Nasturtium Nasturtium-aquaticum</i>	180.7	-194.6	<i>Lophira alata</i>
171.3(?)	<i>Ribes rubrum</i>	181.0	-205.0	<i>Ceiba pentandra</i>
171.3 -180.1	<i>Brassica Napus</i>	181.2		<i>Foeniculum officinale</i>
171.52	<i>Asclepias gigantea</i>	181.2		<i>Isatis tinctoria</i>
171.6	<i>Brassica campestris</i>	181.3		<i>Trifolium incarnatum</i>
171.8 -192.3	<i>Butyrospermum Parkii</i>	181.4		<i>Acanthosicyos horrida</i>
172.1	<i>Brassica juncea</i>	181.75-187.7		<i>Cydonia vulgaris</i>
172.1	<i>Sorghum cernuum</i>	181.9	-203.0	<i>Pentaclethra macrophylla</i>
172.26-175.3	<i>Brassica sp. (Jamba oil)</i>	182.0		<i>Coriandrum sativum</i>
172.3	<i>Medicago sativa</i>	182.0	-190.0	<i>Sinapis nigra</i>
172.8	<i>Crataegus Oxyacantha</i>	182.3	-183.8	<i>Olea europea var. sativa (seed)</i>
172.9 -178.5	<i>Brassica campestris</i>			<i>Prunus Armeniaca</i>
173.0 -183.1	<i>Ximenia americana</i>	182.3	-198.2	<i>Lens esculenta</i>
173.4	<i>Armoracia rusticana</i>	182.4		<i>Amorpha fruticosa</i>
173.4 -212.01	<i>Sterculia foetida</i>	182.5		<i>Mimusops Djave</i>
173.6	<i>Lecythis ollaria</i>	182.5	-188.6	<i>Cicer arietinum</i>
173.8 -181.6	<i>Raphanus sativus</i>	182.6		<i>Triticum sp.</i>
174.0 -176.0	<i>Raphanus Raphanistrum</i>	182.8	-190.3	<i>Tamarindus indica</i>
174.4	<i>Eruca sativa</i>	183.0		<i>Anthriscus Cerefolium</i>
174.4 -180.3	<i>Brassica oleracea</i>	183.1		<i>Vicia sepium</i>
174.5 -193.05	<i>Poga oleosa</i>	183.1		<i>Pithecoctenium echinatum</i>
174.7 -178.9	<i>Brassica Rapa</i>	183.2		<i>Trigonella Foenum-graecum</i>
175.1(?)	<i>Galega officinalis</i>			<i>Lycopersicum esculentum</i>
175.2	<i>Onobrychis sativa</i>	183.4		
176.0	<i>Anethum graveolens</i>			
176.3	<i>Garcinia tonkinensis</i>	183.6	-192.0	
176.5	<i>Petroselinum sativum</i>			

183.8	<i>Setaria italica</i>	188.5	<i>Cephalotaxus drupacea</i>
184.0	<i>Phalaris canariensis</i>	188.5 -190.5	<i>Jessenia polycarpa</i>
184.1	<i>Voandzeia subterranea</i>	188.6	<i>Cupressus sempervirens</i>
184.5	<i>Pisum sativum</i>	188.6	<i>Linaria reticulata</i>
184.5	<i>Parkia africana</i>	188.6 -192.6	<i>Manihot Glaziovii</i>
184.5 -198.9	<i>Payena oleifera</i>	188.6 -195.3	<i>Couepia grandifolia</i>
184.6 -187.7	<i>Moringa oleifera</i>	188.7	<i>Phaseolus inamoenus</i>
184.7	<i>Vicia Faba</i>	188.7 -191.9	<i>Vateria indica</i>
184.7 -191.6	<i>Ricinodendron africanum</i>	188.7 -203.0	<i>Olea europea</i> var. <i>sativa</i> (pulp)
184.8	<i>Tilia parvifolia</i>	188.8	<i>Limonia Warneckeii</i>
185.0	<i>Lallemantia iberica</i>	188.9 -192.2	<i>Guilzotia abyssinica</i>
185.0	<i>Lupinus luteus</i>	189.3	<i>Pinus monophylla</i>
185.0	<i>Funtumia elastica</i>	189.0	<i>Anthyllis vulneraria</i>
185.0	<i>Sterculia appendiculata</i>	189.0 -196.8	<i>Papaver somniferum</i>
185.0	<i>Dialyanthera otoa</i>	189.2	<i>Phaseolus vulgaris</i> var. <i>albus</i>
185.1 -196.0	<i>Elaeococca vernicia</i>	189.2	<i>Parthenocissus quinquefolia</i>
185.3	<i>Ornithopus sativus</i>		
185.6	<i>Vigna Catjang</i>	189.2 -190.0	<i>Echinops ritro</i>
185.6 -196.9	<i>Melia Azadirachta</i>	189.1 -192.5	<i>Prunus Persica</i>
185.6 -197.0	<i>Arachis hypogaea</i>	189.2	<i>Phaseolus lunatus</i>
185.6 -206.1	<i>Hevea brasiliensis</i>	189.2	<i>Carthamnus Oxyacantha</i>
185.8 -188.0	<i>Myagrum sativum</i>	189.4	<i>Trifolium repens</i>
186.0 -194.6	<i>Bassia butyracea</i>	189.4	<i>Rubus fruticosus</i>
186.0 -202.0	<i>Datura Stramonium</i>	189.5	<i>Trigonella Foenugraecum</i>
186.2	<i>Lupinus angustifolius</i>	189.5	<i>Trifolium repens</i>
186.5	<i>Canavalia ensiformis</i>	189.5	<i>Bassia Mottleyana</i>
186.5 -197.5	<i>Joliffa africana</i>	189.5 -191.5	<i>Prunus Amygdalus</i>
186.58	<i>Carica Papaya</i>	189.5 -195.4	<i>Pinus montana</i>
186.6 -191.7	<i>Stearodendron Stuhlmannii</i>	189.6	<i>Phaseolus coccineus</i>
186.6 -193.3	<i>Carthamnus tinctorius</i>	189.6	<i>Carya ovata</i>
186.7	<i>Thuja occidentalis</i>	189.6	<i>Coula edulis</i>
186.7 -202.9	<i>Citrullus Colocynthis</i>	189.7	<i>Citrullus vulgaris</i>
186.8 -192.6	<i>Canarium pachyphyllum</i>	189.7 -191.8	<i>Amoora Rohituka</i>
186.8 -191.5	<i>Garcinia indica</i>	189.7 -192.3	<i>Zea Mays</i>
187.0 -192.0	<i>Cucumis Chate</i>	189.7 -192.6	<i>Canarium polyphyllum</i>
187.2	<i>Trifolium hybridum</i>	189.7 -200.2	<i>Juglans Sieboldiana</i>
187.4 -188.5	<i>Bassia longifolia</i>	189.8	<i>Pinus sylvestris</i>
187.5	<i>Dolichos Lablab</i>	189.8	<i>Aleurites cordata</i>
187.5	<i>Phaseolus Mungo</i>	189.9	<i>Trifolium pratense</i> var. <i>perenne</i>
187.6	<i>Manniophyton fulvum</i>	189.9 -192.4	<i>Adansonia Grandidieri</i>
187.8 -190.3	<i>Argemone mexicana</i>	190.0	<i>Nicotiana Tabacum</i>
187.8 -195.8	<i>Luffa aegyptiaca</i>	190.0 -193.0	<i>Cannabis sativa</i>
187.9	<i>Melilotus albus</i>	190.1	<i>Vaccinium Vitis-idaea</i>
187.9 -194.6	<i>Strophanthus hispidus</i>	190.2 -192.7	<i>Linum usitatissimum</i>
188.0	<i>Pinus cembra</i>	190.3	<i>Omphalea megacarpa</i>
188.0	<i>Diospyros virginiana</i>	190.4	<i>Vaccinium Myrtillus</i>
188.0	<i>Vicia Faba</i>	190.5	<i>Cucumis Melo</i>
188.0 -193.0	<i>Sesamum indicum</i>	190.5	<i>Celosia cristata</i>
188.0 -194.0	<i>Helianthus annuus</i>	190.5	<i>Pinus Picea</i>
188.1	<i>Caryodendron orinocense</i>	190.5	<i>Hedera Helix</i>
188.1 -198.5	<i>Prunus domestica</i>	190.5 -191.7	<i>Adansonia digitata</i>
188.2	<i>Cajanus bicolor</i>	190.6	<i>Caragana arborescens</i>
188.3	<i>Acrocomia sclerocarpa</i>	190.6 -192.5	<i>Glycine hispida</i>
188.3 -195.5	<i>Thea sasangua</i>	190.7	<i>Lotus corniculatus</i>
188.3 -196.2	<i>Bassia villosa</i>	190.8 -193.8	<i>Rhus glabra</i>
188.4	<i>Torreya nucifera</i>	190.9	<i>Petroselinum sativum</i>
188.4	<i>Citrus Limonia</i>	190.9 -193.4	<i>Perilla nankinensis</i>
188.4	<i>Melampyrum arvense</i>		
188.4	<i>Trifolium agrarium</i>		
188.4 -190.2	<i>Cucurbita Pepo</i>		

191.0	<i>Calophyllum inophyl-</i>	194.15	<i>Sterculia chica</i>
	<i>lum</i>	194.5	<i>Nigella sativa</i>
191.0	<i>Cannabis sativa</i>	194.5	<i>Aesculus Hippocastanum</i>
191.0 -192.0	<i>Ungnadia speciosa</i>	194.6	<i>Gynandropsis penta-</i>
191.0 -194.5	<i>Gossypium sp. (cotton)</i>		<i>phylla</i>
191.1	<i>Lactuca Scariola var.</i>	194.6	<i>Moronobea coccinea</i>
	<i>oleifera</i>	194.6	<i>Blighia sapida</i>
191.1 -196.3	<i>Fagus sylvatica</i>	194.74	<i>Garcinia morella</i>
191.2	<i>Shorea aptera</i>	194.9 -197.1	<i>Cucurbita maxima</i>
191.3	<i>Torreya californica</i>	195.0	<i>Anacardium occidentale</i>
191.3	<i>Pinus Gerardiana</i>	195.0	<i>Lycopodium</i>
191.3	<i>Morus alba</i>	195.2	<i>Oenothera biennis</i>
191.5	<i>Melia Azedarach</i>	195.2	<i>Citrus aurantifolia</i>
191.5	<i>Cucurbita maxima</i>	195.2	<i>Abelmoschus esculentus</i>
191.5 -195.2	<i>Ricinodendron Rautanenii</i>	195.2 -196.9	<i>Cucumis sativus</i>
		195.5	<i>Vitis vinifera</i>
191.8	<i>Pinus Cembra</i>	195.6 -197.2	<i>Carapa guianensis</i>
191.8	<i>Hesperis matronalis</i>	195.7 -196.2	<i>Cucurbita Pepo</i>
191.8 -202.0	<i>Theobroma Cacao</i>	195.98	<i>Citrus Limonia</i>
191.9	<i>Thea japonica</i>	196.0	<i>Secale cereale</i>
191.9	<i>Thea sinensis</i>	196.3 -205.5	<i>Elaeis guineensis</i>
192.0	<i>Pentadesma Kerstingii</i>	196.42	<i>Calotropis gigantea</i>
192.0	<i>Chisocheton Cumingianus</i>	196.5	<i>Daphne Cnidium</i>
192.0	<i>Plukenetia conophora</i>	196.5	<i>Moquilea tomentosa</i>
192.0	<i>Maclura pomifera</i>	196.5 -197.2	<i>Astrocaryum vulgare</i>
192.0	<i>Pinus Abies</i>	196.6	<i>Lappa minor</i>
192.0 -192.5	<i>Cornus sanguinea</i>	196.8 -209.3	<i>Sambucus racemosa</i>
192.12	<i>Argania sideroxylin</i>	197.0	<i>Gynocardia odorata</i>
192.3	<i>Rubus idaeus</i>	197.0	<i>Canarium oleosum</i>
192.4	<i>Robinia Pseudoacacia</i>	197.0	<i>Canarium luzonicum</i>
192.4	<i>Oncoba echinata</i>	197.0	<i>Pentadesma butyracea</i>
192.6	<i>Cytisus Laburnum</i>	197.0 -210.0	<i>Laurus nobilis</i>
192.6	<i>Pinus Pineae</i>	197.1	<i>Martynia louisiana</i>
192.7	<i>Picramnia Lindeniana</i>	197.25	<i>Basiloxylon brasiliensis</i>
192.8	<i>Madia sativa</i>	197.6	<i>Hodgsonia Kadam</i>
192.8	<i>Pinus monophylla</i>	197.6 -199.5	<i>Caryocar butyrosom</i>
192.8	<i>Lupinus albus</i>	198.0	<i>Carya Pecan</i>
192.8 -197.1	<i>Corylus Avellana</i>	198.0	<i>Trichilia emetica</i>
192.9 -215.6	<i>Croton Tiglium</i>	198.1	<i>Carapa grandiflora</i>
193.0	<i>Parthenocissus quinque-</i>	198.2	<i>Citrullus vulgaris</i>
	<i>folia</i>	198.4	<i>Datura Metel</i>
193.0	<i>Bryonia dioica</i>	198.5	<i>Skaphium lanceatum</i>
193.2	<i>Jatropha Curcas</i>	198.5	<i>Xanthophyllum lancea-</i>
193.4	<i>Medicago sativa</i>		<i>tum</i>
193.4	<i>Illicium religiosum</i>	198.6	<i>Spartium junceum</i>
193.4	<i>Echinocystis oregana</i>	199.3	<i>Quercus agrifolia</i>
193.4 -194.1	<i>Asparagus officinalis</i>	199.5	<i>Aegiphila obducta</i>
193.4 -202.0	<i>Bertholletia excelsa</i>	199.8	<i>Myrtus communis</i>
193.48	<i>Perilla frutescens</i>	200.3 -213.0	<i>Hydnocarpus Kurzii</i>
193.5 -194.3	<i>Colophonia mauritiana</i>	201.5	<i>Croton Elliotianus</i>
193.6	<i>Buchanania latifolia</i>	201.5	<i>Palaquium oblongi-</i>
193.7	<i>Fragaria vesca</i>		<i>folium</i>
193.7 -196.37	<i>Citrus Aurantium</i>	201.5	<i>Trichilia subcordata</i>
193.8 -197.3	<i>Juglans regia</i>	202.0 -203.0	<i>Nerium Oleander</i>
193.8	<i>Illicium verum</i>	202.0	<i>Pyrus Malus</i>
193.8	<i>Polygala Senega</i>	202.8	<i>Vernonia anthelmintica</i>
193.8	<i>Nephelium lappaceum</i>	203.0	<i>Hyptis spicigera</i>
193.9	<i>Thea sasanqua</i>	203.0 -204.0	<i>Terminalia Catappa</i>
194.0	<i>Prunus Laurocerasus</i>	203.1	<i>Citrullus Naudinianus</i>
194.0	<i>Jatropha mahafalensis</i>	203.5 -208.1	<i>Hydnocarpus Wightiana</i>
194.0 -196.5	<i>Citrullus vulgaris</i>	203.6	<i>Trichilia emetica</i>
194.1	<i>Balanites aegyptiaca</i>	203.7 -205.8	<i>Mesua ferrea</i>

203.8 -210.4	<i>Stillingia sebifera</i>	239.5 -240.2	<i>Myristica platysperma</i>
205.0	<i>Magnolia hypoleuca</i>	241.2 -250.0	<i>Irvingia</i> spp.
205.7 -217.0	<i>Myricacerifera</i>	241.39	<i>Machilus Thunbergii</i>
205.9	<i>Pithecolobium dulce</i>	242.2	<i>Allophylus racemosa</i>
206.2 -212.0	<i>Hydnocarpus anthe-</i> <i>lenticus</i>	242.36	<i>Salvadora oleoides</i>
208.0	<i>Sorbus Aucuparia</i>	242.5 -243.3	<i>Astrocaryum vulgare</i>
208.0	<i>Arbutus Unedo</i>	244.0	<i>Myristica surinamensis</i>
209.2	<i>Oenocarpus distichus</i>	244.7	<i>Litsea zeylanica</i>
210.98	<i>Phoenix dactylifera</i>	245.2	<i>Salvadora persica</i>
211.0	<i>Betula alba</i>	246.2	<i>Mauritia vinifera</i>
213.9	<i>Mimusops elengi</i>	246.3 -250.0	<i>Elaeis guineensis</i>
215.02	<i>Myristica canarica</i>	246.4	<i>Akebia quinata</i>
215.3 -227.0	<i>Schleichera trijuga</i>	251.0	<i>Polygala butyracea</i>
216.2	<i>Chorisia Peckoltiana</i>	251.0	<i>Cocos nucifera</i>
217.5 -237.5	<i>Rhus sylvestris</i>	252.4 -256.5	<i>Attalea cohune</i>
218.8 -220.3	<i>Viola bicuhyba</i>	255.0	<i>Myristica angolensis</i>
220.6	<i>Rhus diversiloba</i>	255.6	<i>Lindera sericea</i>
221.5	<i>Viola guatemalensis</i>	256.6 -349.0	<i>Attalea excelsa</i>
223.5(?)	<i>Celastrus senegalensis</i>	262.2	<i>Telfairia occidentalis</i>
224.4	<i>Magnolia hypoleuca</i>	268.2	<i>Lepidadenia Wightiana</i>
224.72	<i>Cyperus esculentus</i>	270.0(?)	<i>Capsicum annuum</i>
227.4 -234.6	<i>Areca catechu</i>	273.6	<i>Lindera praecox</i>
229.2	<i>Luffa acutangula</i>	277.3	<i>Ulmus campestris</i>
234.8	<i>Apeiba</i> sp.	280.0	<i>Hordeum vulgare</i>
235.0 -235.6	<i>Irvingia Oliveri</i>	282.0	<i>Lindera triloba</i>
238.5	<i>Scyphocephalum</i> <i>ochocoa</i>	283.8	<i>Cinnamomum Cam-</i> <i>phora</i>
		339.6(?)	<i>Citrus aurantifolia</i>

SPECIFIC GRAVITY OF OILS, FATS AND WAXES AT 15° C.

0.832 -0.836	<i>Raphia Ruffa</i>	.9137- .9167	<i>Mimusops Djave</i>
.8594- .9177	<i>Butyrospermum Parkii</i>	.9143	<i>Citrullus vulgaris</i>
.865	<i>Mucuna urens</i>	.9147	<i>Canarium polyphyllum</i>
.866	<i>Polygala butyracea</i>	.9148	<i>Brassica campestris</i>
.867	<i>Salvadora persica</i>	.9149	<i>Melia Azadirachta</i>
.868	<i>Attalea funifera</i>	.915 - .921	<i>Jatropha Curcas</i>
.868 - .871	<i>Attalea cohune</i>	.915	<i>Adansonia digitata</i>
.8686	<i>Attalea excelsa</i>	.915	<i>Vateria indica</i>
.8715	<i>Viola bicuhyba</i>	.915 - .918	<i>Stillingia sebifera</i>
.8916	<i>Lepidadenia Wightiana</i>	.915 - .9158	<i>Brassica</i> sp. (Jamba oil)
.8943- .9175	<i>Bassia villosa</i>	.9155- .917	<i>Corylus Avellana</i>
.895(?)	<i>Lecythis ollaria</i>	.9156	<i>Caryocar tomentosum</i>
.898	<i>Oncoba echinata</i>	.9158	<i>Brassica juncea</i>
.9002	<i>Luffa acutangula</i>	.9158	<i>Blighia sapida</i>
.9011	<i>Rhus laurina</i>	.9158	<i>Trichilia emetica</i>
.9072	<i>Torreya californica</i>	.9158- .9558	<i>Bassia butyracea</i>
.9072- .9171	<i>Sambucus racemosa</i>	.916 - .9196	<i>Olea europea</i> var. <i>sativa</i>
.9083- .998	<i>Linum usitatissimum</i>	.916	<i>Astrocaryum vulgare</i>
.9092- .9285	<i>Prunus Cerasus</i>	.916	<i>Thea japonica</i>
.9099- .9225	<i>Fagus sylvatica</i>	.916 - .9213	<i>Prunus domestica</i>
.9119	<i>Elaeis guineensis</i>	.9161	<i>Jessenia polycarpa</i>
.912	<i>Carapa guianensis</i>	.9162	<i>Quercus agrifolia</i>
.912	<i>Ribes rubrum</i>	.9163	<i>Thea sasanqua</i>
.9125	<i>Picramnia Lindeniana</i>	.9164	<i>Pentaclethra macro-</i> <i>phylla</i>
.9126- .916	<i>Sinapis alba</i>	.9165- .920	<i>Arachis hypogaea</i>
.9127- .920	<i>Moringa oleifera</i>	.9165- .9178	<i>Raphanus sativus</i>
.9127-	<i>Garcinia tonkinensis</i>	.9165- .9248	<i>Ximenia americana</i>
.9127	<i>Garcinia indica</i>	.9169	<i>Canavalia ensiformis</i>
.9128- .9225	<i>Canarium commune</i>	.917	<i>Trifolium incarnatum</i>
.9137	<i>Sorbus Aucuparia</i>		

.917	<i>Trifolium repens</i>	.922	<i>Cydonia vulgaris</i>
.917 - .920	<i>Brassica Rapa</i>	.9221	<i>Sinapis dissecta</i>
.917	<i>Bassia Mottleyana</i>	.9222- .9279	<i>Glycine hispida</i>
.917 - .927	<i>Thea sasanqua</i>	.9224- .926	<i>Myagrum sativum</i>
.9172	<i>Canarium pachyphyllum</i>	.9225	<i>Datura Metel</i>
.9172- .921	<i>Brassica Napus</i>	.9226	<i>Strychnos Nux-vomica</i>
.9175	<i>Vicia Faba</i>	.9228	<i>Sinapis arvensis</i>
.9175- .9186	<i>Raphanus Raphanistrum</i>	.923	<i>Sinapis chinensis</i>
.9175- .921	<i>Brassica campestris</i>	.923	<i>Anthyllis vulneraria</i>
.9175- .923	<i>Datura Stramonium</i>	.923 - .926	<i>Sesamum indicum</i>
.9176	<i>Voandzeia subterranea</i>	.923 - .924	<i>Cucumis sativus</i>
.9177	<i>Eruca sativa</i>	.923	<i>Prunus Laurocerasus</i>
.9177- .9195	<i>Prunus Amygdalus</i>	.923 - .925	<i>Cucurbita Pepo</i>
.9178	<i>Thea sinensis</i>	.923 - .925	<i>Gossypium sp. (cotton)</i>
.9179	<i>Phaseolus vulgaris</i> var. <i>albus</i>	.9232	<i>Armoracia rusticana</i>
.918	<i>Bertholletia excelsa</i>	.9232	<i>Pimpinella Anisum</i>
.918 - .9185	<i>Telfairia pedata</i>	.9232	<i>Nicotiana Tabacum</i>
.918 - .9215	<i>Prunus Persica</i>	.9235	<i>Lupinus angustifolius</i>
.9184	<i>Carya Pecan</i>	.9235	<i>Lupinus luteus</i>
.9184	<i>Cicer arietinum</i>	.9235	<i>Lupinus albus</i>
.9184- .9191	<i>Olea europea</i> var. <i>sativa</i>	.9235	<i>Melia Azedarach</i>
.9184- .922	<i>Citrullus vulgaris</i>	.9235- .9236	<i>Ceiba pentandra</i>
.9185- .9188	<i>Pistacia vera</i>	.9236	<i>Apium graveolens</i>
.9186	<i>Coula edulis</i>	.9237	<i>Daphne Cnidium</i>
.9187	<i>Adansonia Grandidieri</i>	.9238	<i>Torreya nucifera</i>
.9187	<i>Crambe maritima</i>	.9238- .9258	<i>Manihot Glaziovii</i>
.919	<i>Hodgsonia Kadam</i>	.9239	<i>Vicia sativa</i>
.919 - .923	<i>Sinapis nigra</i>	.9239- .9302	<i>Hevea brasiliensis</i>
.919 - .926	<i>Cucurbita maxima</i>	.924	<i>Pimpinella Anisum</i>
.9191	<i>Chelidonium majus</i>	.924	<i>Cheiranthus Cheira</i>
.9191- .9219	<i>Lophira alata</i>	.924	<i>Cucumis Chate</i>
.9192- .9256	<i>Trichilia emetica</i>	.924	<i>Schleicheria trijuga</i>
.9193	<i>Pisum sativum</i>	.924 - .926	<i>Helianthus annuus</i>
.9195(?)	<i>Rhamnus cathartica</i>	.924 - .927	<i>Papaver somniferum</i>
.9198	<i>Phaseolus coccineus</i>	.9241	<i>Viola guatemalensis</i>
.9198	<i>Eruca sativa</i>	.9243	<i>Petroselinum sativum</i>
.9198- .9226	<i>Brassica oleracea</i>	.9244	<i>Diospyros virginiana</i>
.920	<i>Dialyanthera otoba</i>	.9244	<i>Myrtus communis</i>
.920 - .9238	<i>Lepidium sativum</i>	.9245	<i>Delphinium elatum</i>
.920 - .926	<i>Aleurites moluccana</i>	.9245	<i>Morus alba</i>
.920	<i>Balanites aegyptiaca</i>	.9245- .9374	<i>Triticum sp. (wheat)</i>
.9203	<i>Chisocheton Cumingianus</i>	.9247- .9259	<i>Argemone mexicana</i>
.9204	<i>Prunus Armeniaca</i>	.9248	<i>Juglans Sieboldiana</i>
.9205	<i>Nasturtium Nasturtium-aquaticum</i>	.9248	<i>Nigella sativa</i>
.9206	<i>Mauritia vinifera</i>	.9248- .9263	<i>Guizotia abyssinica</i>
.9208	<i>Lens esculenta</i>	.9249	<i>Cucurbita maxima</i>
.9208	<i>Arbutus Unedo</i>	.9249	<i>Strophanthus hispidus</i>
.9209- .9245	<i>Elaeis guineensis</i>	.925	<i>Cephalotaxus drupacea</i>
.921 - .9225	<i>Cornus sanguinea</i>	.925	<i>Myristica surinamensis</i>
.921 - .926	<i>Luffa aegyptiaca</i>	.925	<i>Trifolium hybridum</i>
.9212	<i>Medicago sativa</i>	.925 - .927	<i>Secale cornutum</i>
.9213	<i>Jatropha mahafalensis</i>	.925 - .931	<i>Cannabis sativa</i>
.9214	<i>Barbarea praecox</i>	.9251	<i>Isatis tinctoria</i>
.9214	<i>Scyphocephalum ochococa</i>	.9252	<i>Linaria reticulata</i>
.9215	<i>Ornithopus sativus</i>	.9255	<i>Payena oleifera</i>
.9215- .922	<i>Zea Mays</i>	.9256	<i>Cuminum Cyminum</i>
.9219	<i>Citrullus vulgaris</i>	.9256	<i>Rubus fruticosus</i>
.922	<i>Onobrychis sativa</i>	.9256- .9265	<i>Juglans regia</i>
		.9257- .9259	<i>Rhus glabra</i>
		.9259	<i>Cocos nucifera</i>
		.926	<i>Laurus indica</i>
		.926	<i>Aesculus Hippocastanum</i>

.926 - .928	Cucurbita Pepo	.9337	Cinnamomum Camphora
.9262	Dolichos Lablab		
.9264	Illicium verum	.9342	Perilla frutescens
.9265	Garcinia morella	.9345	Fragaria vesca
.9265	Anthriscus Cerefolium	.9346	Carapa grandiflora
.9266	Croton Elliotianus	.935	Trigonella Foenum-graecum
.9267	Ptychotis ajowan		
.9267- .9277	Carthamnus tinctorius	.9352	Anethum graveolens
.9268	Carum Carvi	.9355- .9382	Ricinodendron africanum
.9268	Cajanus bicolor		
.9268	Pinus Picea	.936	Plukenetia conophora
.9269	Arctium Lappa	.936	Aleurites cordata
.927	Pentadesma butyracea	.936 - .993	Pedilanthus Pavonis
.9275	Apeiba	.9369	Pongamia glabra
.9275	Setaria italica	.937	Lotus corniculatus
.9276	Cucumis Melo	.937 - .939	Perilla nankinensis
.9276	Phaseolus inamoenus	.9371	Lallemantia iberica
.928	Asparagus officinalis	.938	Tilia americana
.928	Galega officinalis	.938	Melilotus albus
.9281	Cajanus bicolor	.938	Telfairia occidentalis
.9282	Phaseolus lunatus	.939	Hyoscyamus niger
.9282	Sorghum cernuum	.939	Euonymus europaea
.9283	Oenothera biennis	.9403	Allophylus racemosa
.9284	Coriandrum sativum	.9406	Crataegus Oxyacantha
.9285- .9286	Madia sativa	.9417	Machilus Thunbergii
.9286	Ricinodendron Rautanenii	.9426	Amorpha fruticosa
		.9435	Celastrus senegalensis
.9288- .932	Echinops ritro	.9437	Croton Tiglium
.9289	Citrullus Colocynthis	.9437	Symphonia globulifera
.929	Sterculia foetida	.945 - .996	Myristica officinalis
.929	Funtunia elastica	.9458	Stillingia sebifera
.929	Trifolium agrarium	.9458	Myristica angolensis
.929	Medicago sativa	.9468	Dipteryx odorata
.9295	Illicium religiosum	.9471	Trigonella Foenum-graecum
.9295	Tilia pravifolia		
.9296	Daucus Carota	.9492	Litsea zeylanica
.9298	Steatodendron Stuhlmannii	.9495	Oryza sativa
		.951 - .9525	Coffea arabica
.9298	Vigna Catjang	.9518	Bassia longifolia
.930	Pinus Cembra	.953	Buchanania latifolia
.9301	Vaccinium Vitis-idaea	.9577	Vicia Faba
.9304	Foeniculum officinale	.958	Hydnocarpus Kurzii
.9307	Pinus Gerardiana	.959 - .960	Hydnocarpus anthelmintica
.9315	Irvingia spp.	.9591- .9679	Ricinus communis
.9315- .9335	Hesperis matronalis	.9594	Ulmus campestris
.931 - .9386	Amoora Rohituka	.9625	Euonymus verrucosa
.9316	Pinus Cembra	.9637	Polygala Senega
.9316- .941	Linum usitatissimum	.964 - .976	Theobroma Cacao
.9317	Rubus idaeus	.965	Hydnocarpus Wightianus
.9318	Pinus montana		
.932	Gynocardia odorata	.9656	Aegiphila obducta
.9326	Pinus sylvestris	.9656	Triticum spp. (wheat)
.9327	Kickxia elastica	.967	Eriobotrya japonica
.9328	Dialyanthera otoba	.968	Saccharum officinarum
.9329	Salvadora oleoides	.9694	Couepia grandifolia
.933	Pinus monophylla	.9694	Pithecolobium dulce
.933 - .935	Elaeococca vernicia	.9697- .986	Euphorbia antispyllitica
.9331	Vaccinium Myrtillus		
.9332- .953	Laurus nobilis	.9717	Mimusops elengi
.9336	Palaquium sp.	.975	Rhus succedanea
.9336	Phaseolus Mungo	.9786	Ongoeka Klaineana

.988	<i>Argania Sideroxylon</i>	1.4718	<i>Pinus monophylla</i>
.9896	<i>Rhus diversiloba</i>	1.4737	<i>Anacardium occidentale</i>
.990 - .999	<i>Corypha cerifera</i>	1.486	<i>Pinus Pinea</i>
.995	<i>Virola sebifera</i>	1.4869	<i>Picramnia carpinterae</i>
.995	<i>Myrica cerifera</i>	1.4935	<i>Thuja occidentalis</i>
1.0115	<i>Ficus ceriflua</i>	1.4997	<i>Cupressus sempervirens</i>
1.019	<i>Cannabis sativa</i>		

IODINE NUMBERS OF OILS, FATS AND WAXES

1.03- 3.9	<i>Myrica cerifera</i>	38.4	<i>Nephelium lappaceum</i>
1.72	<i>Scyphocephalum ochocoa</i>	39.4	<i>Allophylus racemosa</i>
		39.9	<i>Trichilia subcordata</i>
2.28- 11.54	<i>Lepidadenia Wightiana</i>	40.1	<i>Luffa acutangula</i>
3.2	<i>Vohemaria Messeri</i>	40.1 - 85.7	<i>Myristica officinalis</i>
3.34- 5.2	<i>Irvingia spp.</i>	41.2 - 46.5	<i>Bassia butyracea</i>
3.6 - 17.35	<i>Attalea excelsa</i>	41.85- 49.5	<i>Caryocar tomentosum</i>
4.2 - 15.1	<i>Rhus sylvestris</i>	41.9	<i>Stearodendron Stuhlmannii</i>
4.5	<i>Cinnamomum Camphora</i>	42.3	<i>Pentadesma butyracea</i>
4.98- 6.3	<i>Myristica platysperma</i>	42.31	<i>Palaquium spp.</i>
5.3	<i>Euphorbia xylophylloides</i>	43.4	<i>Telfairia occidentalis</i>
		44.0	<i>Trichilia emetica</i>
5.9	<i>Euphorbia stenoclada</i>	45.9	<i>Pentadesma Kerstingii</i>
5.9	<i>Salvadora persica</i>	46.5	<i>Litsea zeylanica</i>
6.7 - 6.8	<i>Irvingia Oliveri</i>	48.3 - 69.1	<i>Schleichera trijuga</i>
7.48	<i>Salvadora oleoides</i>	48.7	<i>Eriobotrya japonica</i>
7.7 - 10.7	<i>Raphia Ruffa</i>	49.1	<i>Blighia sapida</i>
8.0 - 10.0	<i>Cocos nucifera</i>	50.1 - 64.0	<i>Bassia longifolia</i>
8.79	<i>Rhus diversiloba</i>	50.7	<i>Carica Papaya</i>
9.5 - 18.5	<i>Virola bicuhyba</i>	50.7	<i>Pithecoctenium echinatum</i>
9.61- 17.0	<i>Linum usitatissimum</i>		
10.3 - 17.5	<i>Elaeis guineensis</i>	52.0	<i>Philadelphus coronarius</i>
10.4 - 11.2	<i>Astrocaryum vulgare</i>	52.31	<i>Phoenix dactylifera</i>
11.0 - 13.7	<i>Attalea cohune</i>	52.5	<i>Polygala butyracea</i>
11.44	<i>Rhus laurina</i>	52.6 - 67.85	<i>Bassia latifolia</i>
11.68	<i>Lindera triloba</i>	52.95- 59.74	<i>Canarium polyphyllum</i>
12.3 - 24.3	<i>Areca catechu</i>	53.0 - 57.44	<i>Elaeis guineensis</i>
12.4	<i>Virola guatemalensis</i>	53.9 - 66.0	<i>Adansonia Grandidieri</i>
13.2 - 13.5	<i>Corypha cerifera</i>	54.0	<i>Dialyanthera otoba</i>
13.8	<i>Myristica surinamensis</i>	54.0 - 67.2	<i>Butyrospermum Parkii</i>
14.0 - 20.0	<i>Pedilanthus Pavonis</i>	55.0	<i>Oenocarpus distichus</i>
15.0	<i>Shorea aptera</i>	55.46	<i>Garcinia morella</i>
15.6	<i>Attalea funifera</i>	56.0 - 57.2	<i>Mimusops Djave</i>
19.0 - 37.7	<i>Stillingia sebifera</i>	56.6	<i>Pithecolobium dulce</i>
20.53	<i>Lindera praecox</i>	56.8	<i>Picramnia Lindeniana</i>
22.6	<i>Cannabis sativa</i>	57.1	<i>Canarium luzonicum</i>
25.0 - 34.2	<i>Garcinia indica</i>	57.3	<i>Buchanania latifolia</i>
25.2	<i>Mauritia vinifera</i>	57.65	<i>Paullinia trigona</i>
26.64	<i>Myristica canarica</i>	58.5 - 72.1	<i>Carapa guianensis</i>
26.9	<i>Acrocomia sclerocarpa</i>	58.62- 63.4	<i>Payena oleifera</i>
32.3	<i>Ulmus campestris</i>	59.61- 61.25	<i>Canarium pachyphyllum</i>
32.8 - 41.7	<i>Theobroma Cacao</i>	60.0	<i>Saccharum officinarum</i>
33.42	<i>Gossypium spp.</i>	60.25	<i>Melia Champaca</i>
34.3	<i>Palaquium oblongifolium</i>	61.4	<i>Chorisia Peckoltiana</i>
		61.6	<i>Trifolium incarnatum</i>
35.06- 57.6	<i>Euphorbia antisiphilitica</i>	61.6	<i>Lupinus albus</i>
		61.8	<i>Galega officinalis</i>
36.6	<i>Xanthophyllum lanceatum</i>	62.3	<i>Cyperus esculentus</i>
		63.0	<i>Canarium oleosum</i>
36.6	<i>Skaphium lanceatum</i>	63.2 - 65.0	<i>Bassia Mottleyana</i>
37.82- 39.63	<i>Vateria indica</i>	63.9	<i>Picramnia carpinterae</i>

64.15	<i>Aegiphila obducta</i>	82.5 - 90.8	<i>Hydnocarpus anthe-</i> <i>minticus</i>
64.2	<i>Symphonia globulifera</i>	83.2	<i>Lupinus angustifolius</i>
64.7 - 65.6	<i>Canarium commune</i>	83.3 -105.0	<i>Arachis hypogaea</i>
65.0	<i>Trichilia emetica</i>	83.36	<i>Coula edulis</i>
65.1	<i>Sapindus rarak</i>	83.6	<i>Betula alba</i>
65.29	<i>Lindera sericea</i>	83.61- 87.8	<i>Pistacia vera</i>
65.4	<i>Myristica angolensis</i>	83.65-179.5	<i>Couepia grandifolia</i>
65.9	<i>Trifolium hybridum</i>	83.7	<i>Carapa grandiflora</i>
66.0 - 80.5	<i>Laurus nobilis</i>	83.9 - 90.2	<i>Corylus Avellana</i>
66.0 - 96.0	<i>Hodgsonia Kadam</i>	84.0	<i>Anacardium occiden-</i> <i>tale</i>
66.08	<i>Machilus Thunbergii</i>	84.2 -100.7	<i>Joliffa africana</i>
66.5	<i>Mimusops elengi</i>	84.27	<i>Calotropis gigantea</i>
67.7	<i>Onobrychis sativa</i>	84.5	<i>Capsicum annum</i>
68.3	<i>Lupinus luteus</i>	85.24-129.0	<i>Eriodendron anfractu-</i> <i>sum</i>
68.5	<i>Trifolium repens</i>	85.4	<i>Dryopteris Filix-mas</i>
69.0	<i>Ornithopus sativus</i>	85.7 - 99.5	<i>Pentaclethra macro-</i> <i>phylla</i>
69.4 - 79.3	<i>Strychnos Nux-vomica</i>	85.89- 91.2	<i>Coffea arabica</i>
69.44	<i>Ceiba pentandra</i>	86.0	<i>Calophyllum inophyllum</i>
69.6 - 72.9	<i>Melia Azadirachta</i>	86.1	<i>Canavalia ensiformis</i>
69.8 - 72.5	<i>Lophira alata</i>	86.2	<i>Garcinia tonkinensis</i>
70.0	<i>Lotus corniculatus</i>	86.7	<i>Celastrus senegalensis</i>
70.52	<i>Asclepias gigantea</i>	86.99- 87.8	<i>Olea europea var. sativa</i>
71.0	<i>Vernonia anthelmintica</i>	87.1	<i>Tamarindus indica</i>
71.1 - 74.5	<i>Secale cornutum</i>	88.0	<i>Nerium Oleander</i>
71.4	<i>Melilotus albus</i>	88.0 - 90.49	<i>Thea sasanqua</i>
71.6	<i>Anthyllis vulneraria</i>	88.3	<i>Coriandrum sativum</i>
71.64	<i>Lecythis ollaria</i>	88.5 -102.5	<i>Hydnocarpus Wighti-</i> <i>anus</i>
72.2 -112.6	<i>Moringa oleifera</i>	88.7 - 89.1	<i>Mesua ferrea</i>
73.02-101.6	<i>Strophanthus hispidus</i>	88.7 -133.4	<i>Cucurbita maxima</i>
73.4	<i>Jessenia polycarpa</i>	89.53	<i>Magnolia hypoleuca</i>
73.75	<i>Tropaeolum majus</i>	89.9	<i>Caesalpinia Bonducella</i>
74.8 - 75.7	<i>Astrocaryum vulgare</i>	89.7 - 93.3	<i>Poga oleosa</i>
75.2	<i>Limonia Warneckei</i>	89.94	<i>Hydnocarpus edulis</i>
75.9	<i>Trifolium agrarium</i>	90.0	<i>Parthenocissus quinque-</i> <i>folia</i>
76.14- 87.0	<i>Sterculia foetida</i>	90.0	<i>Hordeum vulgare</i>
76.4	<i>Basiloxylon brasiliensis</i>	90.4 -108.7	<i>Prunus Armeniaca</i>
76.7 - 77.8	<i>Adansonia digitata</i>	90.4 -104.4	<i>Hydnocarpus Kurzii</i>
77.28- 91.7	<i>Olea europea var. sativa</i>	90.42	<i>Thea sinensis</i>
77.3 - 94.0	<i>Pongamia glabra</i>	90.6	<i>Illicium religiosum</i>
77.9	<i>Apeiba sp.</i>	91.2 -104.0	<i>Prunus domestica</i>
78.38	<i>Akebia quinata</i>	91.6	<i>Parkia africana</i>
78.4 - 81.8	<i>Polygala Senega</i>	91.65-107.0	<i>Oryza sativa</i>
78.9	<i>Sterculia chica</i>	91.8	<i>Hedera Helix</i>
78.9	<i>Medicago sativa</i>	91.8	<i>Cuminum Cyminum</i>
80.0 - 85.0	<i>Ximenia americana</i>	92.1 - 97.68	<i>Sinapis alba</i>
80.1	<i>Petroselinum sativum</i>	92.5 -109.7	<i>Prunus Persica</i>
80.4	<i>Thea japonica</i>	92.7	<i>Crambe maritima</i>
80.78	<i>Chisocheton Cuming-</i> <i>ianus</i>	92.8 -122.6	<i>Prunus Cerasus</i>
81.0	<i>Lycopodium</i>	92.85-112.4	<i>Raphanus sativus</i>
81.4 - 90.6	<i>Ricinus communis</i>	93.0	<i>Acer Pseudo-platanus</i>
81.44-110.6	<i>Sambucus racemosa</i>	93.0 -101.26	<i>Prunus Amygdalus</i>
81.5	<i>Moquilea tomentosa</i>	93.1	<i>Illicium verum</i>
81.5 - 82.0	<i>Ugnadia speciosa</i>	93.6 -101.9	<i>Brassica oleracea</i>
81.8	<i>Terminalia Catappa</i>	94.4	<i>Dolichos Lablab</i>
81.88	<i>Secale cereale</i>	94.7	<i>Torreya californica</i>
81.9	<i>Trigonella Foenum-</i> <i>graecum</i>	94.8	<i>Apium graveolens</i>
82.0	<i>Vicia Faba</i>		
82.3	<i>Thea sasanqua</i>		
82.4	<i>Sterculia appendiculata</i>		

95.2	Abelmoschus esculentus	109.2	Citrus Limonia
95.2 -103.5	Brassica sp. (Jamba oil)	109.2	Magnolia hypoleuca
95.3 -104.6	Brassic Napus	109.5	Petroselinum sativum
95.4	Aesculus Hippocastanum	110.2	Anthriscus Cerefolium
		111.0	Tilia americana
95.94	Argania Sideroxylon	111.0	Vicia sepium
96.1 -112.5	Triticum sp.	111.2 -120.1	Fagus sylvatica
96.4 -100.0	Brassica Rapa	111.3	Phaseolus Mungo
97.26-104.0	Citrus Aurantium	111.8	Jatropha mahajalensis
98.3 -104.9	Jatropha Curcas	111.8	Isatis tinctoria
98.3 -106.2	Bertholletia excelsa	112.0	Voandezia subterranea
98.6	Nasturtium Nasturtium-aquaticum	113.0 -113.2	Datura Stramonium
98.89	Sorghum cernuum	113.0 -120.2	Cydonia vulgaris
99.0	Foeniculum officinale	113.5 -126.0	Sinapis nigra
99.2	Brassica campestris	115.2 -115.6	Triticum sp.
99.6	Vicia Faba	115.5	Phalaris canariensis
99.7	Oncoba echinata	116.2	Datura Metel
99.72	Eruca sativa	116.5	Echinocystis oregana
99.8	Coriandrum sativum	116.6	Acanthosicyos horrida
99.8	Phaseolus lunatus	116.8	Diospyros virginiana
100.0	Acer platanoides	117.0 -128.5	Cucumis Chate
100.0 -101.0	Cornus sanguinea	117.1 -121.8	Citrullus vulgaris
100.4	Lens esculenta	117.5 -119.5	Madia sativa
100.7	Quercus agrifolia	117.6 -118.5	Cucumis sativus
100.8	Vigna Catjang	117.6 -137.0	Manihot Glaziovii
100.9 -120.5	Gossypium sp. (cotton)	117.6 -139.3	Hevea brasiliensis
101.0	Manniophyton fulvum	118.3	Pinus Gerardiana
101.3	Pinus monophylla	118.5	Cicer arietinum
101.4 -121.7	Brassica campestris	118.6	Nicotiana Tabacum
101.7 -109.0	Croton Tiglium	118.6	Laurus indica
101.72-133.5	Lepidium sativum	118.9	Phaseolus inamoenus
101.8	Eruca sativa	119.0	Nigella sativa
101.8	Brassica juncea	119.5	Gynandropsis pentaphylla
102.6	Sinapis arvensis	119.6	Anethum graveolens
102.7	Cajanus bicolor	119.7	Trifolium repens
103.0 -115.0	Sesamum indicum	119.7	Omphalea megacarpa
103.3	Sinapis chinensis	119.7 -130.7	Cucurbita Pepo
104.0	Mucuna urens	119.7 -135.0	Helianthus annuus
104.8	Melampyrum arvense	119.91-122.5	Argemone mexicana
105.0	Raphanus Raphanistrum	120.3	Citrullus Naudinianus
		120.4 -129.3	Citrullus Colocynthis
105.0	Balanites aegyptiaca	120.5	Pinus Abies
105.1	Daucus Carota	120.9	Pinus Pineae
105.3	Pimpinella Anisum	120.9	Pinus Picea
105.6	Sinapis dissecta	121.0	Pyrus communis
106.0 -107.0	Citrullus vulgaris	121.0	Cucurbita maxima
106.0	Carya Pecan	121.0	Zea Mays
106.0	Pisum sativum	121.0 -130.8	Martynia louisiana
106.8	Carya ovata	122.5	Citrullus vulgaris
106.9 -125.0	Lycopersicum esculentum	123.7	Tilia parvifolia
		123.9	Glycine hispida
107.2	Vicia sativa	124.0 -143.0	Trifolium pratense var. perenne
107.25	Citrus Limonia	124.3	Cheiranthus Cheira
107.5	Myrtus communis	124.58	Citrus aurantifolia
108.0	Pinus monophylla	126.0	Cucurbita Pepo
108.5	Caryodendron orinocense	126.0 -129.6	Daphne Cnidium
		126.1	Celosia cristata
108.51	Luffa aegyptiaca	126.3	Guizotia abyssinica
108.6	Pimpinella Anisum	126.6 -133.8	Rhus glabra
108.8	Ptychotis ajowan	126.9	
108.9	Prunus Laurocerasus		

127.6	<i>Lactuca scariola</i> var. oleifera	142.2	<i>Torreya nucifera</i>
128.5	<i>Sorbus Aucuparia</i>	143.3	<i>Armoracia rusticana</i>
128.5	<i>Carum Carvi</i>	143.3	<i>Morus alba</i>
128.6 -134.8	<i>Aleurites ricinodendron</i>	145.6 -160.7	<i>Stillingia sebifera</i>
128.9	<i>Caragana arborescens</i>	145.7	<i>Pinus montana</i>
129.5	<i>Fraxinus excelsior</i>	147.1	<i>Pinus sylvestris</i>
130.3	<i>Cephalotaxus drupacea</i>	147.7 -148.2	<i>Aleurites Ricinodendron</i>
130.4	<i>Setaria italica</i>	147.8	<i>Rubus fruticosus</i>
130.4 -130.7	<i>Vitis vinifera</i>	147.8	<i>Arbutus Unedo</i>
130.9	<i>Kickxia elastica</i>	148.0 -166.0	<i>Cannabis sativa</i>
131.7	<i>Cytisus Laburnum</i>	148.9	<i>Oenothera biennis</i>
131.7 -134.86	<i>Amoora Rohituka</i>	149.0 -161.3	<i>Elaeococca vernicia</i>
132.1 -151.7	<i>Juglans regia</i>	149.7 -161.5	<i>Humulus Lupulus</i>
132.6 -157.5	<i>Papaver somniferum</i>	151.6 -171.7	<i>Aleurites cordata</i>
133.3	<i>Cucumis Melo</i>	152.5	<i>Papaver somniferum</i>
133.7	<i>Amorpha fruticosa</i>	152.5	<i>Ribes rubrum</i>
134.0	<i>Spartium junceum</i>	152.8	<i>Gynocardia odorata</i>
134.0	<i>Maclura pomifera</i>	152.8	<i>Crataegus Oxyacantha</i>
135.0	<i>Pyrus Malus</i>	153.6	<i>Lappa minor</i>
135.1	<i>Cupressus sempervirens</i>	153.9	<i>Citrus aurantifolia</i>
135.1	<i>Bryonia dioica</i>	154.2	<i>Medicago sativa</i>
135.1 -142.4	<i>Myagrurn sativum</i>	154.8	<i>Thuja occidentalis</i>
135.49	<i>Carthamnus Oxyacantha</i>	154.9 -155.3	<i>Hesperis matronalis</i>
135.6	<i>Melia Azedarach</i>	155.0	<i>Rhamnus cathartica</i>
135.7	<i>Phaseolus vulgaris</i> var. albus	155.0 -164.0	<i>Aleurites moluccana</i>
137.1 -140.0	<i>Asparagus officinalis</i>	156.3	<i>Pinus Cembra</i>
137.3	<i>Barbarea praecox</i>	156.5	<i>Juglans Sieboldiana</i>
137.8	<i>Trigonella Foenum- graecum</i>	159.2	<i>Pinus Cembra</i>
138.0	<i>Hyoscyamus niger</i>	161.0	<i>Robinia Pseudoacacia</i>
138.0 -139.0	<i>Funtumia elastica</i>	162.1	<i>Lallemantia iberica</i>
138.1 -141.2	<i>Echinops ritro</i>	167.2	<i>Vaccinium Myrtillus</i>
138.5	<i>Croton Elliotianus</i>	169.2	<i>Vaccinium Vitis-idaea</i>
138.64-149.93	<i>Carthamnus tinctorius</i>	170.0 -201.0	<i>Linum usitatissimum</i>
140.0	<i>Linaria reticulata</i>	171.0	<i>Hyptis spicigera</i>
141.2	<i>Phaseolus coccineus</i>	174.8	<i>Rubus idaeus</i>
141.4	<i>Parthenocissus quinque- folia</i>	177.3 -204.0	<i>Plukenetia conophora</i>
		180.3	<i>Fragaria vesca</i>
		193.3 -195.0	<i>Perilla nankinensis</i>
		196.45	<i>Perilla frutescens</i>

OIL GROUPS

Taxaceae §
Cephalotaxus (D)
Torreya (ND)
Torreya (D)

Pinaceae *
Pinus (D)
Thuja (D)
Cupressus (D)

Gramineae §
Paniceae
Panicum (D)
Maydeae
Zea (SD)
Oryzeae
Oryza (ND)
Andropogoneae
Sorghum (SD)

Phalarideae
Phalaris (SD)

Hordeae
Secale (SD)
Triticum (SD)
Hordeum (SD)

Palmae †
Phoenix (ND)
Corypha (W)
Mauritia (F)
Raphia (W, F)
Ceroxylon (W)
Kloppstockia (W)
Jessenia (ND)
Euterpe (SD)
Oenocarpus (F, SD Kernel)
Areca (F)
Elaeis (F)

- Attalea (F)
- Cocos (F)
- Acrocomia (F)
- Astrocaryum (F)
- Liliaceae §
- Asparagus (D)
- Myricaceae †
- Myrica (F)
- Juglandaceae *
- Juglans (D)
- Carya (SD)
- Betulaceae *
- Corylus (ND)
- Betula (ND)
- Fagaceae *
- Fagus (SD)
- Quercus (ND)
- Ulmaceae §
- Ulmus (ND)
- Moraceae †
- Morus (D)
- Maclura (D)
- Ficus (W)
- Humulus (D)
- Cannabis (D, W)
- Olaceae †
- Ongokea (D)
- Ximenia (ND)
- Coula (ND, F)
- Chenopodiaceae §
- Bassia (F)
- Amaranthaceae †
- Celosia (D)
- Ranunculaceae *
- Nigella (SD)
- Delphinium (SD)
- Lardizabalaceae
- Akebia (ND)
- Magnoliaceae * †
- Magnolia (SD)
- Illicium (SD)
- Myristicaceae
- Viola (F)
- Scyphocephalum (F)
- Lauraceae †
- Cinnamomum (F)
- Persea (F)
- Machilus (F)
- Tetranthera (F)
- Lepidadenia (F)
- Litsea (F)
- Lindera (ND)
- Laurus (F, SD)
- Papaveraceae *
- Chelidonium (SD)
- Argemone (D)
- Papaver (W, D)
- Cruciferae *
- Barbarea (SD)
- Nasturtium (SD)
- Cheiranthus (D)
- Armoracia (SD)
- Hesperis (D)
- Eruca (SD)
- Sinapis (SD)
- Brassica (SD)
- Lepidium (SD)
- Myagrum (D)
- Isatis (SD)
- Crambe (SD)
- Raphanus (SD)
- Capparidaceae † †
- Gynandropsis (SD)
- Resedaceae †
- Reseda (D)
- Moringaceae †
- Moringa (ND)
- Saxifragaceae *
- Philadelphus (W)
- Ribes (D)
- Rosaceae *
- Chrysobalanaceae
- Moquilea (ND)
- Couepia (D)
- Pruneae
- Prunus (ND)
- Rubeae
- Rubus (D)
- Potentilleae
- Fragaria (D)
- Pomeae
- Cydonia (ND)
- Sorbus (D)
- Pyrus (SD)
- Eriobotrya (F)
- Crataegus (D)
- Leguminosae §
- Ingeae
- Pithecolobium (F)
- Mimoseae
- Parkia (F)
- Pentaclethra (ND)
- Amherstieae
- Tamarindus (SD)
- Caesalpinieae
- Caesalpinia (SD)
- Genisteae
- Lupinus (ND)
- Spartium (SD)
- Trifolieae
- Trigonella (ND)
- Medicago (D, ND)

- Melilotus (ND)
 Trifolium (ND, SD)
 Ornithopus (ND)
- Loteae
 Anthyllis (ND)
 Lotus (ND)
- Galegeae
 Amorpha (D)
 Galega (ND)
 Robinia (D)
 Caragana (D)
- Hedysareae
 Onobrychis (ND)
 Arachis (ND)
- Dalbergieae
 Pongamia (F)
 Dipteryx (F)
- Vicieae
 Cicer (SD)
 Lens (SD)
 Vicia (SD)
 Pisum (SD)
- Phaseoleae
 Cajanus (SD)
 Glycine (D)
 Canavalia (SD)
 Mucuna (SD)
 Phaseolus (SD)
 Voandzeia (SD)
 Vigna (SD)
 Dolichos (SD)
- Tropaeolaceae
 Tropaeolum (ND)
- Linaceae
 Linum (D, W)
- Zygophyllaceae † ‡
 Balanites (SD)
- Rutaceae †
 Limonia (F)
 Citrus (SD)
- Simarubaceae †
 Simaruba (F)
 Brucea (ND)
 Irvingia (F)
 Picramnia (F)
- Burseraceae †
 Canarium (ND, F)
- Meliaceae †
 Melieae
 Melia (F, D)
 Trichillieae
 Chisocheton (ND)
 Amoora (D)
 Carapa (F)
 Trichilia (F)
- Polygalaceae §
 Polygala (ND, F)
- Xanthophyllum (F)
 Skaphium (F)
- Euphorbiaceae †
 Plukenetia (D)
 Euphorbia (W)
 Pedilanthus (W)
 Croton (SD, D)
 Manniophyton (SD)
 Caryodendron (SD)
 Ricinus (ND)
 Aleurites (D)
 Elaeococca (D)
 Jatropha (SD)
 Hevea (D)
 Manihot (D)
 Omphalea (SD)
 Stillingia (D, F, seed coat)
- Anacardiaceae †
 Anacardium (ND)
 Buchananian (F)
 Pistacia (ND)
 Rhus (F, SD, seed kernel)
- Celastraceae *
 Euonymus (SD)
 Celastrus (ND)
- Aceraceae *
 Acer (D?)
- Hippocastanaceae
 Aesculus (ND)
- Sapindaceae †
 Paullinia (F)
 Allophylus (F)
 Sapindus (ND)
 Schleichera (F)
 Nephelium (F)
 Blighia (F)
 Ungnadia (ND)
- Rhamnaceae §
 Rhamnus (D)
- Vitaceae †
 Vitis (ND)
 Parthenocissus (SD)
- Tiliaceae †
 Apeiba (ND)
 Tilia (SD)
- Malvaceae †
 Abelmoschus (SD)
 Gossypium (W, SD)
- Bombacaceae †
 Adansonia (F)
 Eriodendron (SD, W)
- Sterculiaceae †
 Theobroma (F)
 Sterculia (ND)
 Basiloxylon (F)
- Ochnaceae †
 Lophira (F)

Caryocaraceae	Araganum (ND)
Caryocar (F)	Mimusops (F)
Dipterocarpaceae ‡	Ebenaceae † ‡
Shorea (F)	Diospyros (SD)
Vateria (F)	Oleaceae * ‡
Theaceae † ‡	Fraxinus (SD)
Thea (ND)	Olea (ND)
Guttiferae ‡	Salvadoraceae
Moronobeae	Salvadora (F)
Symphonia (F)	Loganiaceae ‡
Pentadesma (F)	Strychnos (F)
Cariniceae	Apocynaceae ‡
Garcinia (F)	Kickxia (D)
Calophylleae	Funtumia (D)
Calophyllum (ND)	Nerium (ND)
Mesua (ND)	Strophanthus (ND)
Flacourtiaceae ‡	Asclepiadaceae ‡
Oncoba (F)	Asclepias (W)
Hydnocarpus (F)	Calotropis
Gynocardia (D)	Cynanchum (W)
Caricaceae † ‡	Verbenaceae ‡
Carica (F)	Aegiphila (F)
Combretaceae ‡	Labiatae *
Terminalia (ND)	Lallemantia (D)
Thymelaeaceae §	Perilla (D)
Daphne (SD)	Hyptis (D)
Myrtaceae ‡	Solanaceae ‡
Myrtus (SD)	Hyoscyamus (D)
Lecythidaceae ‡	Capsicum (SD)
Bertholletia (SD)	Lycopersicum (SD)
Lecythis (ND)	Datura (SD)
Rhizophoraceae ‡	Nicotiana (SD)
Poga (ND)	Scrophulariaceae §
Onagraceae *	Linaria (D)
Oenothera (D)	Melampyrum (ND)
Araliaceae † *	Bignoniaceae ‡
Hedera (ND)	Pithecoctenium (F)
Umbelliferae *	Pedaliaceae † ‡
Anthriscus (SD)	Sesamum (SD)
Cuminum (SD)	Martyniaceae ‡
Apium (SD)	Martynia (SD)
Petroselinum (SD)	Rubiaceae ‡
Pimpinella (SD)	Coffea (ND)
Anethum (SD)	Caprifoliaceae ‡
Cornaceae *	Sambucus (ND)
Cornus (ND)	Cucurbitaceae ‡
Ericaceae *	Hodgsonia (F)
Arbutus (D)	Telfairia (ND)
Vaccinium (D)	Acanthosicyos (SD)
Sapotaceae ‡	Luffa (SD, F)
Payena (F)	Bryonia (SD)
Mimusops (F)	Citrullus (SD)
Palaquium (F)	Cucumis (SD)

Cucurbita (SD)
Echinocystis (SD)

Compositae §
Vernonia (ND)
Helianthus (D)
Guizotia (D)

Madia (D)
Echinops (D)
Lappa (D)
Carthamnus (D)
Mogumia (W)
Lactuca (SD)

* Temperate † Subtropical ‡ Tropical § Widely distributed

D=Drying SD=Semi-drying ND=Non-drying F=Fat W=Wax

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